

IN THE CLAIMS

1. (currently amended) A method of thermal spraying a ceramic material not sensitive to oxidation or nitridation consisting essentially of thermal spraying said ceramic material from a thermal spray device with ~~an~~ ambient temperature coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device to produce a desired uniform microstructure coating on at least a portion of the surface of a substrate having a complex shape and a standoff distance between the surface of the substrate and the exit end of the shielded thermal spray device is at least 20% longer than the standoff distance of a non-shielded thermal spray device and said shielded gas flowing thermal spraying (i) producing a uniform microstructure coating similar to a uniform microstructure coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (ii) producing a coating having a density similar to the density of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (iii) producing a coating having a segmentation crack density similar to the segmentation crack density of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (iv) producing a coating in which the deposition efficiency and deposition rate of said coating would be similar to the deposition efficiency and deposition rate of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, and (v) producing said desired uniform microstructure coating on at least a portion of the surface of said substrate having a complex shape that would not be possible using the smaller standoff of the non-shielded thermal spraying device, wherein said method using the shield gas exhibits a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the

thermal spray device is substantially lower than without said shield gas, and in which said temperature effect does not continuously increase with increasing flow rate of the shield gas.

2. (canceled)

3. (original) The method of claim 1 wherein the standoff distance is at least 50% longer.

4. (original) The method of claim 1 wherein the coaxial shield gas flow is an essentially turbulent gas flow substantially surrounding the effluent of the thermal spray device.

5. (original) The method of claim 3 wherein the coaxial shield gas flow is an essentially turbulent gas flow substantially surrounding the effluent of the thermal spray device.

6. (currently amended) The method of claim ~~2~~1 wherein said ceramic material is an oxide.

7. (original) The method of claim 6 wherein said oxide is zirconia or a compound containing zirconia.

8. (currently amended) The method of claim ~~2~~1 wherein said coating comprises layers of the ceramic material.

9. (currently amended) The method of claims ~~2~~1 wherein said gas used in the coaxial gas shield is selected from the group consisting of argon, nitrogen, air and mixtures thereof.
10. (original) The method of claim 9 wherein the gas is argon.
11. (canceled)
12. (currently amended) The method of claim ~~4~~3 wherein said ceramic is zirconia or a compound containing zirconia.
13. (currently amended) The method of claim ~~4~~3 wherein said coating comprises layers of the ceramic material.
14. (withdrawn) A coated article having a coated layer wherein the coated layer is produced by the method of claim 1.
15. (withdrawn) The coated article of claim 14 wherein the coating is a ceramic material.
16. (withdrawn) The coated article of claim 14 wherein said article is a component of a gas turbine engine.
17. (withdrawn) The coated article of claim 15 wherein said article is a component of an internal combustion engine.
18. (withdrawn) The coated article of claim 15 wherein the coated layer is produced by the method of claim 3.

19. (withdrawn) The coated article of claim 18 wherein said article is a component of a gas turbine engine.

20. (withdrawn) The coated article of claim 18 wherein said article is a component of an internal combustion engine.

21. (currently amended) The method of claim ~~21~~ wherein the ceramic is selected from the group consisting of oxides, nitrides, carbides and other materials not sensitive to oxidation or nitridation.

22. (previously presented) The method of claim 1 wherein the substrate having a complex shape is selected from turbine blades and vanes.

23. (currently amended) A method of thermal spraying a ceramic material not sensitive to oxidation or nitridation consisting of thermal spraying said ceramic material from a thermal spray device with ~~an ambient temperature~~ coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device to produce a desired uniform microstructure coating on at least a portion of the surface of a substrate having a complex shape and a standoff distance between the surface of the substrate and the exit end of the shielded thermal spray device is at least 20% longer than the standoff distance of a non-shielded thermal spray device and said shielded gas flowing thermal spraying (i) producing a uniform microstructure coating similar to a uniform microstructure coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (ii) producing a coating having a density similar to the density of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (iii) producing a coating

having a segmentation crack density similar to the segmentation crack density of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (iv) producing a coating in which the deposition efficiency and deposition rate of said coating would be similar to the deposition efficiency and deposition rate of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, and (v) producing said desired uniform microstructure coating on at least a portion of the surface of said substrate having a complex shape that would not be possible using the smaller standoff of the non-shielded thermal spraying device, wherein said method using the shield gas exhibits a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the thermal spray device is substantially lower than without said shield gas, and in which said temperature effect does not continuously increase with increasing flow rate of the shield gas.

24. (currently amended) A method of thermal spraying a ceramic material not sensitive to oxidation or nitridation consisting of thermal spraying said ceramic material from a thermal spray device with ~~an~~ an ambient temperature coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device to produce a desired uniform microstructure coating on at least a portion of the surface of a substrate having a complex shape and a standoff distance between the surface of the substrate and the exit end of the shielded thermal spray device is at least 50% longer than the standoff distance of a non-shielded thermal spray device and said shielded gas flowing thermal spraying (i) producing a uniform microstructure coating similar to a uniform microstructure coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (ii) producing a coating having a density

similar to the density of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (iii) producing a coating having a segmentation crack density similar to the segmentation crack density of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (iv) producing a coating in which the deposition efficiency and deposition rate of said coating would be similar to the deposition efficiency and deposition rate of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, and (v) producing said desired uniform microstructure coating on at least a portion of the surface of said substrate having a complex shape that would not be possible using the smaller standoff of the non-shielded thermal spraying device, wherein said method using the shield gas exhibits a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the thermal spray device is substantially lower than without said shield gas, and in which said temperature effect does not continuously increase with increasing flow rate of the shield gas.

25. (new) A method of thermal spraying a ceramic material not sensitive to oxidation or nitridation consisting essentially of thermal spraying said ceramic material from a thermal spray device with an ambient temperature coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device to produce a desired uniform microstructure coating on at least a portion of the surface of a substrate having a complex shape and a standoff distance between the surface of the substrate and the exit end of the shielded thermal spray device is at least 20% longer than the standoff distance of a non-shielded thermal spray device and said shielded gas flowing thermal spraying (i) producing a uniform microstructure coating similar to a uniform

microstructure coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (ii) producing a coating having a density higher than the density of a coating that would be produced using the same standoff of the non-shielded thermal spraying device, (iii) producing a coating having a segmentation crack density higher than the segmentation crack density of a coating that would be produced using the same standoff of the non-shielded thermal spraying device, (iv) producing a coating in which the deposition efficiency and deposition rate of said coating would be greater than the deposition efficiency and deposition rate of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, and (v) producing said desired uniform microstructure coating on at least a portion of the surface of said substrate having a complex shape that would not be possible using the smaller standoff of the non-shielded thermal spraying device, wherein said method using the shield gas exhibits a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the thermal spray device is substantially lower than without said shield gas, and in which said temperature effect does not continuously increase with increasing flow rate of the shield gas.

26. (new) A method of thermal spraying a ceramic material not sensitive to oxidation or nitridation consisting of thermal spraying said ceramic material from a thermal spray device with an ambient temperature coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device to produce a desired uniform microstructure coating on at least a portion of the surface of a substrate having a complex shape and a standoff distance between the surface of the substrate and the exit end of the shielded thermal spray device is at least 20% longer than the standoff distance of a non-

shielded thermal spray device and said shielded gas flowing thermal spraying (i) producing a uniform microstructure coating similar to a uniform microstructure coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (ii) producing a coating having a density higher than the density of a coating that would be produced using the same standoff of the non-shielded thermal spraying device, (iii) producing a coating having a segmentation crack density higher than the segmentation crack density of a coating that would be produced using the same standoff of the non-shielded thermal spraying device, (iv) producing a coating in which the deposition efficiency and deposition rate of said coating would be greater than the deposition efficiency and deposition rate of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, and (v) producing said desired uniform microstructure coating on at least a portion of the surface of said substrate having a complex shape that would not be possible using the smaller standoff of the non-shielded thermal spraying device, wherein said method using the shield gas exhibits a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the thermal spray device is substantially lower than without said shield gas, and in which said temperature effect does not continuously increase with increasing flow rate of the shield gas.

27. (new) A method of thermal spraying a ceramic material not sensitive to oxidation or nitridation consisting of thermal spraying said ceramic material from a thermal spray device with an ambient temperature coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device to produce a desired uniform microstructure coating on at least a portion of the surface of a substrate having a complex shape and a standoff distance between the surface of the substrate and the exit end of the shielded



thermal spray device is at least 50% longer than the standoff distance of a non-shielded thermal spray device and said shielded gas flowing thermal spraying (i) producing a uniform microstructure coating similar to a uniform microstructure coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, (ii) producing a coating having a density higher than the density of a coating that would be produced using the same standoff of the non-shielded thermal spraying device, (iii) producing a coating having a segmentation crack density higher than the segmentation crack density of a coating that would be produced using the same standoff of the non-shielded thermal spraying device, (iv) producing a coating in which the deposition efficiency and deposition rate of said coating would be greater than the deposition efficiency and deposition rate of a coating that would be produced using the smaller standoff of the non-shielded thermal spraying device, and (v) producing said desired uniform microstructure coating on at least a portion of the surface of said substrate having a complex shape that would not be possible using the smaller standoff of the non-shielded thermal spraying device, wherein said method using the shield gas exhibits a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the thermal spray device is substantially lower than without said shield gas, and in which said temperature effect does not continuously increase with increasing flow rate of the shield gas.